

524: BOARD OF ELEVATOR REGULATIONS

524 CMR 17.00: POWER PASSENGER AND FREIGHT ELEVATORS (FOR INSTALLATIONS MADE PRIOR TO JULY 1, 1989)

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17.01 through 17.40- (no proposed changes)

17.41: Registration of Freight Elevators Exempt under Chapter 288 of the Acts of 1962

All owners of freight elevators exempt under Chapter 288 of the Acts of 1962 shall register all exempt elevators with the Board of Elevator Regulations on a form provided by the Board. The Board shall issue a certificate of registration to the owner or to the person in charge of each exempt freight elevator. The owner or person in charge shall post the certificate in a conspicuous place in or near the cab or car of such elevator.

17.42: Hydraulic Cylinders for Freight Elevators Exempt under Chapter 288 of the Acts of 1962

All hydraulic cylinders buried in the ground that were installed without a safety bulkhead shall have a governor-operated safety or a plunger gripper installed by March 23, 2009.

17.43: Car Frames for Freight Elevators Exempt under Chapter 288 of the Acts of 1962

(1) Car suspension frames, platform frames, and platform stringers of freight elevators exempt under Chapter 288 of the Acts of 1962 shall be constructed of steel meeting not less than the requirements of specification A7 of the ASTM.

(2) The stresses of rolled steel sections or annealed cast steel used in the construction of car frames and platforms based on the static load imposed on them, including the weight of the unloaded car and the maximum rated carrying capacity, shall not exceed the values given in 524 CMR 17.13: *Table 2* for freight cars.

The stresses tabulated in 524 CMR 17.13 are based on steels having an ultimate strength from 55,000 to 65,000 pounds per square inch for rolled sections or cast steel and 46,000 to 56,000 pounds per square inch for rivets. For steels of greater ultimate strength, the allowable stresses may be increased proportionately. However, any such deviating proportionality calculations must be performed and stamped by a registered Professional Engineer (P.E.) and submitted to the Board for approval.

(3) No cast iron shall be used in the construction of any member of the car frame or platform subject to tension or bending. Cast iron may be used for compensating cable anchorages, releasing carriers, and guideshoe stands.

(4) The deflection of crosshead and safety plank shall not exceed 1/8 inch in each ten feet of span under static conditions with contract load substantially uniformly distributed over the car platform.

(5) The slenderness ratio L/R for members not normally subject to compression shall not exceed 250; for members normally subject to compression this ratio shall not exceed 120. Loading resulting from buffer and safety operation shall not be considered normal loading.

(6) No glass shall be used in freight elevators except to cover certificates, lighting fixtures, vision panels and appliances necessary for the operation of the car.

(7) There shall be no obstructions or projections in the car floor.

(8) Where platform floors are constructed of wood or other combustible materials they shall

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be covered on the underside with sheet metal of not less than No. 27 U. S. Gauge thickness.

(9) Elevators provided with car leveling or inching devices shall have their platforms provided with a metal guard not less than No. 16 U. S. Gauge in thickness. This guard shall extend horizontally the full width of the car entrance and vertically below the car floor for not less than the depth of the leveling or inching zone plus three inches. The lower edge of the guard shall be beveled at an angle of not less than 70 [degrees] with the horizontal.

(10) The requirements for loading classifications will be found in 524 CMR 33.00. Satisfaction as to compliance will be evidenced by the manufacturer's certificate.

(11) Welding of parts upon which safe operation of all equipment contained in 524 CMR depends shall be done by American Welding Society (AWS) certified welders; and all work upon completion shall be approved by the state elevator inspector before the elevator, escalator, dumbwaiter, *etc.*, is placed in service.

EXCEPTION: Tack welds not later incorporated into finished welds carrying calculated loads.

(12) Full compliance with all provisions of 524 CMR 17.43 is required by March 23, 2009.

17.44: Machines and Machinery for Freight Elevators Exempt under Chapter 288 of the Acts of 1962

Beginning on March 23, 2009, freight elevators exempt under Chapter 288 of the Acts of 1962 shall be direct drive as defined in 524 CMR 3.00 and shall meet the following requirements:

(1) Drums and leading sheaves shall be of cast iron or steel, and shall have finished grooves. U-grooves shall be not more than one-sixteenth inch larger than the ropes. The pitch diameter of sheaves or drums for hoisting or counterweight ropes shall be not less than 40 times the nominal diameter of the rope. Opening in drums shall be drilled at an angle of not over 45 [degrees] with the run of the rope and shall be provided with a rounded corner with a radius at least equal to that of the rope.

(2) The factor of safety based on the static load to be used in the design of elevator hoisting machines shall be not less than ten for cast iron, cast steel, or materials other than wrought iron or wrought steel. For wrought iron or wrought steel, the factor of safety shall be eight.

(3) No set-screw fastenings shall be used in lieu of keys or pins if the connection is subject to torque or tension. Shafts which support drums, gears, couplings and other members and which transmit torque shall be provided with tight fitting keys. A fillet shall be provided at any point of change in the diameter of driving-machine sheave shafts, or drums to prevent excessive stress concentrations in the shafts.

(4) No friction gearing or clutch mechanism shall be used for connecting the drums or sheaves to the main driving gear of power elevators.

(5) No belt or chain-driven machine shall be used to drive any power elevator.

(6) No worm gearing having cast iron teeth shall be used for any power elevator machine.

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(7) Electric elevator machines shall be equipped with electrically released brakes which are applied by compression springs. No brakes shall be released until power has been applied to the motor.

(8) No single-ground, short-circuit, or counter-voltage shall prevent the action of the brake magnet from allowing the brake to set in the intended manner during normal operation. No motor field discharge, counter-voltage, single ground, or accidental short-circuit shall retard the action of the brake magnet in allowing the brake to set during emergency stops.

(9) Welding. Welding of parts on which safe operation depends shall be done in accordance with the appropriate standards established by the American Welding Society. All welding of such parts shall be done by welders certified by the American Welding Society.

(10) Numbering of Elevators. When machinery of more than one elevator is in a machine room, each elevator machine shall be assigned a different elevator number which shall be painted on or securely attached to the driving machine and visible from the disconnect switch. The corresponding disconnect switch shall carry the same elevator number.

17.45: Guide Rails for Freight Elevators Exempt under Chapter 288 of the Acts of 1962

(1) Guide rails for cars and counterweights on freight elevators exempt under Chapter 288 of the Acts of 1962 shall be made of steel. Where steel rails present an accident hazard, as in chemical or explosive industries, wood guide rails may be used. Guide rails for cars and counterweights on exempt freight elevators shall follow the guide rail dimensions provided in Table 1 of Section 17.30. However, counterweight rails made of wood which were installed prior to March 9, 1950, may remain provided that no other wood is present in the hoistway.

(2) Length of Guide Rails.

- (a) For hydraulic elevator where the car is secured directly to the top of a hydraulic plunger the guide rails shall be extended at the top and bottom to prevent the guide shoes from running off when the plunger is fully extended or fully compressed.
- (b) For all other power elevators the guide rails shall be continuous from the bottom to the top of the hoistway.

(3) Weight of Guide Rails.

- (a) The weight of steel guide rails shall not be less than given in 524 CMR 17.30(3) Table 2.

(4) Joints of Steel Guide Rails. Joints of steel guide rails shall be:

- (a) Accurately machined with tongue and groove through the webs at right angles to the base and through the flanges parallel to the base, and fitted with fishplates each secured with not less than four substantial bolts through each rail; or,
- (b) Accurately machined with tongue and groove through the webs and with backs of the flanges where the fishplates bear accurately machined at right angles to the tongue and groove and fitted with finished fishplates each secured with not less than four substantial bolts through each rail.

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(5) Guide Rail Bolts. Guide rail bolts for fishplates, ties, brackets, backing, clips through bolts, and supports shall be not less than the sizes given in 524 CMR 17.30(3) Table 5.

(6) Guide Rail Brackets.

(a) Guide rails shall be securely fastened in position with brackets, through bolts, ties, clips, or backing of steel of such strength, design, and spacing that the guide rails and their fastenings shall not deflect between supports more than 1/4 inch under normal operation. Welding may be used to fasten rail supports to building steel provided the welding is done by an American Welding Society certified welder.

(b) Where the supports are more than 14' on centers, rail backing shall be used regardless of the deflection under normal operation.

(c) Where an elevator is intended to handle heavy loads the guide rails, fastenings, backing, brackets, and supports shall be designed to sustain the thrusts imposed upon them when a concentrated load is on the car sill in addition to when the concentrated load is in place on the car platform.

(d) Guide Rail Brackets and Building Supports. Design and strength of Brackets and Supports.

The building construction forming the supports for the guide rails, and the guide rail brackets, shall be of such design as to:

1. safely withstand the application of the car or counterweight safety when stopping the car and its rated load or the counterweight; and
2. withstand the forces specified in 524 CMR 17.16 within the deflection limits specified.

Where necessary, the building construction shall be reinforced to provide adequate supports for the guide rails. All calculations necessary to achieve compliance with section 17.45(6)(d) must be performed and stamped by a registered Professional Engineer (P.E.).

(7) Bolt Holes. Bolt holes in steel beams for bracket bolts shall not exceed the diameter of the bolt by more than 1/16 inch. Such bolt holes shall be drilled or punched. They shall not be cut with a torch.

(8) Wood Guide Rails. Where the use of steel guide rails creates an explosion hazard, the use of wood guide rails is permitted, provided that:

- (a) the contract speed is not in excess of 100 feet per minute; and,
- (b) the guide rails are of straight grained maple without knots; and,
- (c) the size of the rails is either not less than 2" x 2 1/2" where the car and load is not in excess of 5,000 pounds or not less than 2 5/8" x 3" where the car and load is not in excess of 8,000 pounds.

(9) Use of Car or Counterweight Safeties. Where car or counterweight safeties are used, the guide rails and their supports shall be capable of withstanding the application of the safety

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when stopping the car with contract load or the counterweight when descending at governor tripping speed.

(10) Full compliance with all provisions of 524 CMR 17.45 is required by March 23, 2009.

17.46: Car and Counterweight Safeties for Freight Elevators Exempt under Chapter 288 of the Acts of 1962

(1) Freight elevators exempt under Chapter 288 of the Acts of 1962 which are suspended by ropes shall be equipped with car safeties installed in or on a safety plank located beneath the car platform. Where multiple-type safeties are installed, one such safety shall be located in or on the safety plank located beneath the car platform. The safety or safeties shall be capable of stopping and sustaining the car with contract load.

(a) The application of the safety shall not cause the car platform to become out of level in excess of $\frac{1}{2}$ " per foot, measured in any direction.

(b) When the car safety is applied, no decrease in the tension of the governor rope or motion of the car in the descending direction shall release the car safety.

(c) It is permissible to release the safety by reversing the direction of the motion of the machine.

(d) Car safeties shall be operated by speed governors.

(e) Jaws and other parts of safeties of the sliding type, if made of forged steel of an ultimate strength of not less than 55,000 pounds per square inch and cast steel of an ultimate strength of not less than 65,000 pounds per square inch, may, in action, be stressed to 17,000 pounds per square inch. For steels of greater strength the allowable stresses may be increased proportionately based on ultimate strength.

Cast iron shall not be used in any part of a car safety, the breakage or failure of which would result in failure of the safety device to function, to stop the car and sustain the load.

(f) Bearings for safety drums and screw-shafts shall be of non-ferrous material.

(g) Where two (duplex) safeties are provided, the lower safety device shall be capable of developing not less than $\frac{1}{2}$ of the force required to stop the entire car with rated load. Duplexed safety devices shall be arranged so as to function approximately simultaneously.

Types A or Type C safety devices (see 524 CMR 17.16(19)) shall not be used in multiple.

(h) Type B safeties shall stop the car with its rated load from governor tripping speed within the range of the stopping distances shown in 524 CMR 17.16: *Table 2*.

(2) Exempt freight elevators shall comply with the maximum and minimum stopping distances for Type B car safeties with rated load as provided in 524 CMR 17.16: *Table 1*.

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(3) Full compliance with all provisions of 524 CMR 17.46 is required by March 23, 2009.

17.47: Operating Devices for Freight Elevators Exempt under Chapter 288 of the Acts of 1962

Beginning on March 23, 2009, no power freight elevator exempt under Chapter 288 of the Acts of the 1962 shall be operated by a direct hand-operated rope, cable, or rod, or by a wheel or lever mechanism which motivates an operating rope or cable.

17.48 Operator License Requirements for Freight Elevators Exempt under Chapter 288 of the Acts of 1962

No person shall operate, and no owner, lessee, employer or his agent shall cause or permit any freight elevator exempt under Chapter 288 of the Acts of 1962 to be operated except by a person duly licensed for such service by the Commissioner of Public Safety.

EXCEPTION: An operator's license shall not be required of a qualified licensed mechanic engaged in the construction, maintenance, or repair of elevators or elevator hoistways, or of an inspector having authority to inspect elevators.

(1) Granting of licenses

(a) Whoever desires to act as an operator of elevators exempt under Chapter 288 of the Acts of 1962 shall make application to the Commissioner on blanks to be furnished by the Department of Public-Safety. A license shall not be granted to a person under 18 years of age.

(b) The applicant shall be given a written examination, drafted by the Board of Elevator Examiners, as to their knowledge of the operation of elevators, and if found competent shall be granted a license.

(c) Licenses shall be valid for the term of one year from the date of issuance, and may be renewed annually upon proper application to the Commissioner. If a license is not renewed within one year from the date of expiration, a re-examination shall be required.

(2) Display of Licenses. A licensed operator shall at all times when operating an elevator be required to display his license on demand of the owner or tenant of the building, any person authorized to inspect the elevator, any police officer, or any authorized representative of the Department of Public Safety.

(3) Revocation and Suspension of Licenses.

(a) A willful falsification in the matter of a statement in an application shall be deemed sufficient cause for the revocation at any time of a license granted on said application.

(b) A license may be suspended or revoked by the Commissioner, if the holder is incompetent or untrustworthy or fails to comply with 524 CMR 26.00.

REGUALTORY AUTHORITY

Chapter 45 of the Acts of 2006, G.L. c. 143, §§68, 69.